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Study of Radiation Effects on Mammalian Cells *In Vitro*

A study has been conducted to determine the radiation responses of single cells and cell populations *in vitro*. The cells studied were nondifferentiating diploid cells, derived from Chinese hamster lung tissue, which survive and grow independently under constant culture conditions. The radiation used was X-rays.

The study was concerned with those differences between cells which affect their radiation response. The specific variations studied for response characteristics were the rate at which cells progress through the generation cycle, and the cell's position within the generation cycle. The position of the cells was denoted as "age."

Age response information is important, not only to relate these responses to the fundamental physiological state and nature of the cell but also to understand the post-irradiation kinetics of complex populations both *in vitro* and *in vivo*. The age dependence of the following responses was discussed: division delay, changes in some biochemical processes in the cell, chromosome changes, colony size changes, and loss of reproductive capacity. The age responses were classified into two categories: In category I, the responses were greatest in the mitotic or in the post-DNA synthetic period (G_2); they were less in the pre-DNA period (G_1), decreasing to a least value in the DNA period itself (S). This category included cell killing, total chromosome changes, and colony size changes. In category II, responses rise steadily through the early part of the cycle, reaching a maximum during S and decreasing during G_2 . This category included processes such as DNA synthesis and division delay.

In addition to single cells, cell populations were studied. Since the radiation effects of cells are age dependent, the effectiveness of a given irradiation upon cell populations will depend on the distribution of cell ages in that population. The preliminary findings of the characteristics of the surviving population of Chinese hamster cells after a dose of 710 rads are discussed.

Notes:

1. The study has been reported in "Radiation Effects on Mammalian Cell Population *In Vitro*," by Warren K. Sinclair in *Radiation Research*, 1966; North Holland Publishing Company, Amsterdam (1967), p. 607-631.
2. Inquiries concerning this study may be directed to:

Office of Industrial Cooperation
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9700 South Cass Avenue
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Reference: B68-10294

Source: W. K. Sinclair
Biological and Medical Research Division
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Patent status:

Inquiries about obtaining rights for commercial use of this innovation may be made to:

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